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ABSTRACT

Although computerized instructional materials for foreign language instruction have begun to become available, computer assisted instruction (CAI) in this field has not lived up to its promise for four reasons: poorly designed materials, incompatible machines, incompatibility of machines with textbooks, and equipment costs. Real CAI in classical language instruction will appear when the profession: (1) draws on colleges and universities for the best-designed materials, (2) uses innovative techniques toward sensible ends, (3) develops and tests materials on mainframe computers and then converts them to microcomputer form, and (4) does not ignore the centrality of the textbook in instruction. Two CAI projects illustrate the importance of these principles: the Montevidisco Project at Brigham Young University--a videodisc simulation of a visit to a Mexican town, and the University of Delaware's Latin Skills Project using the computer to inflect variable parts of speech in Latin. The latter not only incorporates all the desired development features but also provides a greatly increased number of exercises without corresponding additional memory need, gives more sophisticated judging of student answers and feedback on partially correct answers, adds the ability to review missed verb forms "invisibly," by presenting a similar form several items after the missed one, and enhances flexibility without loss of individualization. (MSE)

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Making CAI Accessible

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The past few years have seen numerous efforts to introduce computer-assisted instruction into the classroom. Despite the acknowledged promise of the technique, these attempts have so far produced only modest results. Many programs have been written, but most are in use only at their host institutions. Quite a few, in fact, have already fallen into disuse and been relegated to an ignoble retirement on some out-of-the-way disk pack.

Are we about to see a repetition of the language lab phenomenon, in which hundreds of institutions purchased facilities that could never quite deliver on their promises? Will the microcomputer also produce resentment in students and disillusionment in teachers? Why has CAI not fulfilled the bright promises of its heralds?

There are several reasons for this failure, but I believe they are capable of solution. First let me list them.

1. Poorly designed materials. This category includes materials which are technically flawed and will not run, but in particular it refers to those that, although they operate as intended, are so complicated or so pedagogically flawed that they fail to teach. Many, if not most, of the language programs for microcomputers available today suffer from poor design. This is not surprising, for many of them were done by programmers who lack content expertise and are innocent of instructional design

techniques. One example should suffice. In the summer of 1[illegible] I directed a summer institute in computer-based instruction for language teachers. Among the programs we reviewed was one in French called Astro Word Search. A nice piece of programming, it took a random selection of French words from its database and inserted them into a matrix of meaningless letters to create the word-search puzzle format familiar to most of us. This puzzle, however, had French words displayed in all orientations: left to right, right to left, reading up, reading down, even diagonally. Moreover the words were all in capitals, with the letters touching each other in succeeding lines, and all was done in inverse mode (black on white). The result was a glowing screen which produced headaches in several of the group doing the review; and the combined efforts of the eight French teachers present at the review did not suffice to find all the words. Whatever that is, it is not CAI.

2. Incompatible machines are a second reason why CAI has been slow to take hold. Only a few years ago it was typical that the only computer on the campus was used for administrative records and for the computer science department. That meant that in the whole country only one or two hundred machines of a given type were being used by academic institutions. The author of a program on one of these mainframe computers had almost no incentive to rewrite that program to run on another type of machine. With so small a potential market, there was little hope that a new version would sell enough copies to recoup

the cost of the revision.

Of course, the arrival of the micros has changed all that. It has not made the computers any less incompatible, but it has made it economically feasible to think of producing multiple versions of a program and count on each version to sell enough copies to pay for itself. More about this a bit later.

3. Then of course there is the problem of textbooks. An instructional program can hardly ignore the fact that teachers use them, but accommodation to one text is alienation from all others. When there were only a few hundred computers (all mainframes) in the academic world, an instructional program could expect to be used by only those schools which had the same machine, in the same series, and which used the same textbook. I first ran into this harsh reality in 1977 when I completed my first Latin program on the PLATO system. Only a few institutions had PLATO at all, and only some of them used the Wheelock textbook for elementary Latin as we did. The potential field of users for a Latin program keyed to Wheelock and delivered on PLATO was tiny. Had I written the world's finest Latin instructional program (and I had not), very few instructors were in a position to use it.

4. A fourth obstacle to the spread of CAI has been the cost of equipment. When mainframe computers were the only ones to be found, few institutions could spare the resources to do instructional computing at all. Classicists who wanted to participate found themselves in competition with physicists, statisticians,

and sociologists for a very scarce resource. Students had somehow to obtain terminal time. It was awkward and somehow, not suited to the humanistic style. But we in the colleges were far better off than our colleagues in secondary education. We found access to the mainframe difficult; they had no access at all.

But of course, things are changing. Many of these problems are disappearing as microcomputers come into their own. The cost of hardware is dropping dramatically, and schools everywhere are somehow finding money to buy the little machines that promise so much. Surely CAI is about to become accessible, because as we look around we see a whole new industry emerging: educational software. The entrepreneurs gather, catalogs are printed, our mailboxes fill. Is this the dawn of the micro millennium?

In a word, no. The picture has changed drastically in the last three years; there are now many more computers in the schools and there is an air of something about to happen; but whether what happens is education or exploitation depends largely on how we use this new opportunity. A flood of instructional software is about to break over us all, but we have no guarantee that it will really <u>be</u> instructional. Look around you; I am to judge the software competition at Delaware's Junior Classical League convention next month. A harmless activity for the students, right? But watch out! Some of the programs these young people are producing will be used in their classes; some may in fact be published. Software houses are proliferating, and some of them are specializing in foreign language courseware. Some

of the publishing firms are entering the field, and their initial offerings (in modern languages; I have seen no publisher funding Latin or Greek yet) are not very reassuring. Programs of questionable value will appear on the market whether we encourage them or not; how can we make real CAI accessible?

I submit that real CAI in Classics will appear when we observe the following principles:

1. Draw on the resources of colleges and universities for the best-designed materials we can produce;
2. Employ innovative techniques toward sensible ends;
3. Develop and test materials on mainframe computers, then convert them to microcomputer format; and
4. Do not ignore the centrality of the textbook in instruction.

I would like to illustrate this with two CAI projects. They are the Montevidisco Project at Brigham Young University and the University of Delaware's Latin Skills Project. I believe that they show the importance of the principles I am stating here.

The Montevidisco Project, developed by Junius Bennion and others at the David O. McKay Institute of Education at Brigham Young University, grew out of some fundamental views of language learning. The authors were impressed by research in cognitive development which suggests that real learning of language comes from interaction with the real world. The believed it was misguided to concentrate language instruction on the printed page or audio tapes; immersion in the society where the language is spoken

produces a wide variety of stimuli which speed learning and aid retention.

If one cannot provide that cultural immersion, why not simulate it on a rich visual and auditory medium where communication about something like real-life situations takes place? This led them to simulate, on computer-controlled videodisc, a visit to a Mexican town. It works as follows.

The student sits at at computer terminal equipped with a color monitor. He signs on, receives an introduction to the program, and then sees on the monitor that he is wandering through a small town in Mexico. All scenes are filmed in color from the student's viewpoint and are accessed as needed from the videodisc. A native walks up to him, peers at him and says in Spanish, "You're an American tourist, aren't you?" The scene then freezes and four or more possible responses are displayed on the monitor, including the choice to have the native repeat his question. These responses are also in Spanish. The student presses the number of his choice and must also speak his response into a microphone for the system to record. After doing this, he may if he likes hear a surrogate student pronounce the same response. Then the activity continues according to the student's choice. If he asked the native to repeat himself, the videodisc would replay that scene; other choices would have resulted in information on how to get to the beach, or in the native offering to serve as a tour guide, and so on.

The entire adventure consists of twenty-eight sequences

(bar, market, police station), each consisting of several scenes; and each scene has at least four possible responses. Therefore more than 1100 different choices exist, and a student might visit this town several times without repeating the same sequence.

Simulations are notoriously difficult to design. If a user is to be given real choices at various stages, the program will have to contain many branches. The working out of the branching structure required the designers to incorporate what amounted to an elaborate flow chart into the script. There was location filming to do in Hermosillo, Mexico. Film segments had to be organized and eventually transferred to videodisc. The hardware requirements were bewildering: a terminal with color monitor, cassette recorder with microphone, two videodisc players, and control equipment and cabling.

It is highly unlikely that the project would ever have been started if the designers had not had previous experience with PLATO and TICCIT, both mainframe computer instructional systems. This experience gave them a sense of what could be done, given sufficient resources. As it was, the university's resources were inadequate; a federal grant was needed. The project also strained the available technology, since there was no real interactive videodisc when it was begun. Some of the equipment they needed had to be designed. Happily, the Sony corporation announced a video interface with just the needed features just when the project was nearing completion. This commercial interface, cheaper than the locally-designed one,

substantially reduced the cost of the final package. The result is that that the Montevidisco program can now be delivered on an Apple microcomputer.

Notice how the principles I stated are worked out in this project. It did draw on university resources, and beyond. It drew on cognitive research to produce an innovative program (interactive videodisc) that yet served a sensible end. Although not actually developed on mainframe, it came from designers who had substantial experience there. And it is offered as a supplement to traditional instruction much as slide or film packages are, to be used with various textbooks.

The University of Delaware's project was an attempt to beef up basic Latin skills with an innovative technique: generative CAI, or teaching the computer to inflect the variable parts of speech in Latin. This had been done before as a research tool, but no one in this country had applied it to instruction. The technique has some obvious benefits:

1. A vastly expanded number of exercises without corresponding increases in memory requirements. Since the computer produces forms on demand, a small database of stems has maximum impact. For example, a noun-adjective phrase lesson in the series has 100 noun bases and 80 of adjectives. This yields 8,000 possible pairings, each of which may appear in one of ten forms (five cases, singular or plural). Total, 80,000 drill items.
2. Much more sophisticated judging of student answers and feedback on partially correct ones. A program that can conjugate a verb

can be made to separate a student's typed verb into stem, tense/mood sign, and personal ending and comment on it in those terms. The pedagogical potential of such morphemic analysis is clear.

3. "Invisible" review. This is the capability to review missed forms by presenting, three or four items later, not the item that was missed, but a similar one. For example, a student misses ducebat in a drill. Three items later the computer gives him cogebat, thus reviewing the missed concept (third singular imperfect active indicative of the third conjugation) rather than the item. Such review is often invisible to the user, and hence much more effective.

4. Greatly enhanced flexibility without loss of individualization. When the program consists of a sophisticated driver and a modest database of exercises, the database can easily be modified or replaced. Different databases can be provided for different textbooks, thus eliminating one of the most frustrating obstacles to the dissemination of programs.

The generative technique was not very difficult to implement on the mainframe PLATO system, but still four years went into the effort. It produced five skill-building programs, each to be used repeatedly by students over the first year of college Latin study. They cover the areas of morphology, sentence translation, and parsing of Latin words in sentence context. The total amount of instruction received by an average student is from forty to sixty hours.

In 1982 the Office of Computer-Based Instruction allocated

$40,000 to convert the PLATO Latin material to micro format for the Apple II computer. There were major technical difficulties. The smaller machine had far less memory capacity to contain the inflectional routines. PLATO's high-resolution graphics could not be done on the Apple. The PLATO programs relied heavily on the touch-sensitive screen, and Apple had no such feature; nor were there sophisticated answer-judging routines available.

It was necessary to develop an inexpensive but still accurate light pen to mimic the touch feature. Ways were found to condense the inflectional routines to fit into the 48K memory of the Apple II. To our great relief, some of the developers of PLATO released an enhanced version of BASIC, called EnBASIC, just in time for us to make use of its answer-judging routines. And the decision was made to deal with the textbook problem by producing several different databases of exercises, each one keyed to a different elementary Latin textbook.

I am pleased to report that the program will be ready for release as planned at the end of this month. We at Delaware believe that it is a serious contribution to elementary Latin instruction, that is, real CAI for Latin. In terms of the principles expressed earlier: it did draw on the resources of a university for content, for instructional design, and for programming and technical expertise. It was built around an innovative approach that taxed existing technology; when it was begun, no light pen could be had that was cheap and accurate enough; and high-level answer judging was not being done on microcomputers.

Developed on a mainframe computer over a four year period, it was converted to micro format only after lengthy testing and refinement. And it deals with the textbook problem head-on, by providing different versions which each have the powerful generative features in them.

Let me say once more that computer programs in Latin and Greek will in fact become easily accessible within the next year or two, as will programs on many other academic subjects. My concern in this paper is to emphasize that these programs will not necessarily be CAI. If CAI is to become accessible, there must be a commitment to draw on the best academic resources available, to be innovative but only the service of sound pedagogical ends, to develop on large systems bef[illegible]ersion to micros so as to stay abreast of the technol[illegible]s, and to deal realistically with the question of m[illegible]extbooks. If we do not do it right, we are sure to be as[illegible] embarrassing question: why did you do it at all?